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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/561,594	12/20/2005	David Philip Williams	034279-011	9808

21839 7590 08/20/2009

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EXAMINER	
TRAN, HOANG Q	

ART UNIT	PAPER NUMBER
2874	

NOTIFICATION DATE	DELIVERY MODE
08/20/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

Office Action Summary	Application No.	Applicant(s)	
	10/561,594	WILLIAMS ET AL.	
	Examiner	Art Unit	
	HOANG TRAN	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 March 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

AMENDMENT

Receipt of the applicant's amendment filed 3/20/2009 is acknowledged by the examiner.

Currently Claims 1-37 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 9-24, and 27-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wadsworth (2004/0151450 – US) in view of Kawanishi (2001/0026667 US).

In terms of claim 1, 29-30, Wadsworth discloses an elongate waveguide for guiding light, comprising: a core region (Fig. 7 '430'), comprising an elongate region; and a cladding region (440, 450), comprising elongate regions (440) interspersed with elongate regions of (450), in a transverse cross-section of the waveguide, a boundary region (470) that surrounds the core region and has either (1) at most two-fold rotational symmetry, the symmetry of the boundary region resulting at least in part from azimuthal variations therein, which are substantially uncharacteristic of the cladding region (the two fold rotational symmetry is visible in Fig. 7 and Paragraph [0026]). Wadsworth

discusses the use of materials having two fold symmetry in the portion cited above of which are the materials used in the clad and core of the fiber in (Figure 7).

Wadsworth does not teach wherein the core region is of low refractive index.

Kawanishi does teach wherein the core is of lower refractive index in a photonic crystal configuration in order to main polarization within the waveguide [0019].

It would have been obvious to one of ordinary skill in the art to adjust the material of the use in Wadsworth in order to modify the fiber to be a polarization maintaining fiber (Kawanishi - [0019]). Further it would have been obvious to one of ordinary skill in the art to modify the waveguide of Wadsworth with the teachings of Kawanishi because they are from the same field of endeavors.

Regarding Claims 2-3, Wadsworth teaches the two-fold rotation symmetry at least in part due to azimuthally variations in its thickness, shape, refractive index, or other material properties (Para [0026] and [0035]). Wadsworth discusses the use of materials having two fold symmetry in the portion cited above of which are the materials used in the clad and core of the fiber in (Figure 7).

Regarding Claim 9, Wadsworth teaches wherein boundary region comprises an inner periphery and an outer periphery, which has a substantially different form than the inner periphery (See Figure 7 and [0085]).

Regarding Claim 10, Wadsworth teaches the two-fold rotation symmetry at least in part due to azimuthally variations in its thickness, shape, refractive index, or other material properties (Para [0026] and [0035]). Wadsworth discusses the use of materials

having two fold symmetry in the portion cited above of which are the materials used in the clad and core of the fiber in (Figure 7).

Regarding Claim 11, Wadsworth teaches further wherein the boundary region comprises a plurality of boundary cells around the core region (Figure 7: 430, 440, 450, 470).

Regarding Claim 12, Wadsworth teaches the two-fold rotation symmetry at least in part due to azimuthally variations in its thickness, shape, refractive index, or other material properties (Para [0026] and [0035]). Wadsworth discusses the use of materials having two fold symmetry in the portion cited above of which are the materials used in the clad and core of the fiber in (Figure 7).

Regarding Claim 13, Wadsworth teaches wherein the cells together do not tile (See 7).

Regarding Claims 14 and 15, Wadsworth teaches wherein the cladding region comprises an array of relatively low refractive index regions (440 and 450) wherein 440 < 450 in terms of effective refractive index and wherein the structures are periodic (See Figure 7).

Regarding Claim 16, Wadsworth teaches the two-fold rotation symmetry at least in part due to azimuthally variations in its thickness, shape, refractive index, or other material properties (Para [0026] and [0035]). Wadsworth discusses the use of materials having two fold symmetry in the portion cited above of which are the materials used in the clad and core of the fiber in (Figure 7).

Regarding Claims 17 and 19, Wadsworth teaches in order to prevent birefringence one would need a rotational symmetry to be higher than 2 ([0026]).

Regarding Claim 18, Wadsworth teaches the two-fold rotation symmetry at least in part due to azimuthally variations in its thickness, shape, refractive index, or other material properties (Para [0026] and [0035]). Wadsworth discusses the use of materials having two fold symmetry in the portion cited above of which are the materials used in the clad and core of the fiber in (Figure 7).

Regarding Claims 20-22 and 24, Wadsworth teaches wherein the core region maybe solid [0030] or a hole [0030] wherein the hole may be filled with a fluids [0030].

Regarding Claim 23, Wadsworth teaches wherein the high refractive index regions comprise of fused glass ([0085] and [0086]).

Regarding Claim 27, wherein Claim 27 refers to a two polarization states of spatial mode of the waveguide exhibit during operation. This is functional characteristic of the optical waveguide describe in Claim 1. Since all the structures features are met by the prior art. The functional limitation is capable of being performed by said structures as rejected in Claim 1. Hence the examiner has not given patentably weight to the functional limitation of Claim 27 because device of Claim 1 is capable of perform said function (See MPEP 2114).

Regarding Claim 28, Wadsworth in view of Kawanishi does a volume difference in the clad because of the present of voids or holes of which changes the refractive

index, but is silent to an amount by volume of relatively lower refractive index material in the cladding region exceeds 50%.

It would have been obvious to one having ordinary skill in the art at the time of the invention was made to optimize the volume level in order to change the effective refractive index of each regions as taught in Wadsworth [0026] and Kawanishi [0019], since it has held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding Claim 35-36, Wadsworth teaches wherein the boundary region defines the cross-sectional shape of the core region (Figure 7: 430, 440, 450, and 470), wherein the boundary region (470) is arranged at the interface between the core region (430) and the cladding region (450), wherein the boundary region (470) is arranged at the interface between the core region (430) and the cladding region (450).

Regarding Claim 31-34, Wadsworth discloses a method of forming a photonic crystal fiber including the steps: forming a preform comprising an elongate (Figure 7), (430) core region, and, surrounding the core region, an elongate cladding region (440 and 450), comprising elongate regions (440) interspersed with elongate regions (450 or 470); forming, at the interface between the core region and the cladding region (440 and 450), a boundary region , comprising one or more relatively high refractive index regions (450), which has at most two-fold rotational symmetry due to azimuthal variations, which are uncharacteristic of the cladding region; and drawing the pre-form into a fiber, which has no more than two-fold rotational symmetry about any longitudinal axis (Paragraph

[0026] and [0035]). The preform is formed from a plurality of elongate members at least some of which are capillaries (Abstract), in which the preform is formed by extrusion. The arrangement of the capillaries are done in a stacking manner and followed by drawing the preform stack into a fiber.

Wadsworth does not teach wherein the core region is of low refractive index.

Kawanishi does teach wherein the core is of lower refractive index in a photonic crystal configuration in order to main polarization within the waveguide [0019].

It would have been obvious to one of ordinary skill in the art to adjust the material of the use in Wadsworth in order to modify the fiber to be a polarization maintaining fiber (Kawanishi - [0019]). Further it would have been obvious to one of ordinary skill in the art to modify the waveguide of Wadsworth with the teachings of Kawanishi because they are from the same field of endeavors.

Regarding Claim 37, Wadsworth teaches wherein the boundary region defines the cross-sectional shape of the core region (Figure 7: 430, 440, 450, and 470), wherein the boundary region (470) is arranged at the interface between the core region (430) and the cladding region (450), wherein the boundary region (470) is arranged at the interface between the core region (430) and the cladding region (450).

Claim 4-8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wadsworth in view of Kawanishi as applied to claim 1 above, and further in view of Han (US 7,106,933 B2).

Regarding Claim 4, Wadsworth/Kawanishi discloses the invention of claim 1, however, Wadsworth does not disclose boundary nodes around the core region wherein

the nodes being joined between two boundary veins and to at least one relatively high refractive index region of the cladding region.

Han discloses a photonic crystal fiber for high frequency transmission wherein the boundary nodes around the core region wherein the nodes being joined between two boundary veins and to at least one relatively high refractive index region of the cladding region (Figs. 2 and 8 , please note the end to end of the veins joining around the core). Furthermore, the boundary region has at most two-fold rotation symmetry at least in part do to one or more boundary veins having a different thickness, shape, length, refractive index or other material property than other boundary veins (col. 2, line 65 – col. 3, line 5 and col. 7 lines 1-7). It would have been obvious to one having ordinary skill in the art to recognize the packing configuration in the instant case is a kagome lattice wherein the motivation for such configuration is high efficiency and high density packing in a confined region.

Regarding Claims 5-8, Wadsworth/Kawanishi teaches the two-fold rotation symmetry at least in part due to azimuthally variations in its thickness, shape, refractive index, or other material properties (Para [0026] and [0035]). Wadsworth/Kawanishi discusses the use of materials having two fold symmetry in the portion cited above of which are the materials used in the clad and core of the fiber in (Figure 7).

Claim 25-26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wadsworth in view of Kawanishi as applied to claim 1 above, and further in view of Russell (6,959,574 US).

Regarding Claims 25 Wadsworth and Kawanishi teaches the optical waveguide of Claim 1.

Wadsworth and Kawanishi is silent to a beat length of 10 mm at a given wavelength.

Russell teaches wherein any beat length can be introduce into a fiber in order to control or manipulate bi-fringences to order to create a polarization maintaining fiber (Col 2 [35-50]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the teachings of Russell to the device of of Wadsworth and Kawanishi in order to control bi-fringences in a polarization maintaining fiber (Col 2. [35-50]).

Regarding Claims 26, Wadsworth and Kawanishi, teaches wherein given wavelength is in the region of 1550 ([0087]).

Response to Arguments

Applicant's arguments, see Remarks, filed 8/11/2008 with respect to 1, 31 and 34 have been fully considered and are non-persuasive. Upon further review and consideration the examiner has found the arguments to be non-persuasive for the following reasons:

1. The prior art of Wadsworth does not teach wherein the core is a high refractive index region (Remarks Page 9).

The examiner has established a 103(a) rejection wherein the prior art to Kawanishi was introduce to meet this limitation. Therefore the rejection was base on the combination of the two prior art and not just Wadsworth alone. Further the refractive

index of Wadsworth is designed to decrease radially outward. Since Claim 1 did not specified as to what "relatively low refractive" actually is, this limitation is subjective to interpretation. Finally, Claim 1 also has not defined if the "relatively low refractive index region" is the effective refractive index of the whole core or at a small portion of the core. Since Claim 1 is unclear as to what "the relatively low refractive region" actually is, then the prior art of Wadsworth would meet the claim limitation base on the broadly interrupting the limitation as disclosed in Claim 1. Wadsworth teaches the inner portion of the core to have a high refractive index [0085] than the outer portion [0085]. If the refractive index of the outer portion is considered, then Wadsworth core would have a "relative low refractive index region" as claimed in Claim 1.

Further Claim 1 has not defined "relative low refractive index" to what structure or value.

2. The applicant argues that it would not have been obvious to combine the invention of Kawanishi and Wadsworth because the refractive index configuration profile of Wadsworth is limited by the design scope (Remarks Pg 11).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re*

Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Wadsworth also indicated that the refractive index of his invention maybe change to various ranges or values to met specific application [0025].

3. The applicant argues that prior art to Wadsworth does not have 2-fold symmetry (Remarks Pg 10).

The examiner disagree because [0026: lines 4-5] explicitly states that the fiber has two-fold symmetry.

Lastly, newly added Claims 35-37 are rejected as established above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOANG TRAN whose telephone number is (571)272-5049. The examiner can normally be reached on 9:00AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Uyen-Chau Le can be reached on 571-272-2397. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hoang Tran/
Examiner, Art Unit 2874

/Uyen-Chau N. Le/
Supervisory Patent Examiner, Art Unit 2874